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Patent Abstracts of Japan

PUBLICATION NUMBER : 02214886
PUBLICATION DATE : 27-08-90

APPLICATION DATE : 16-02-89
APPLICATION NUMBER : 01036646

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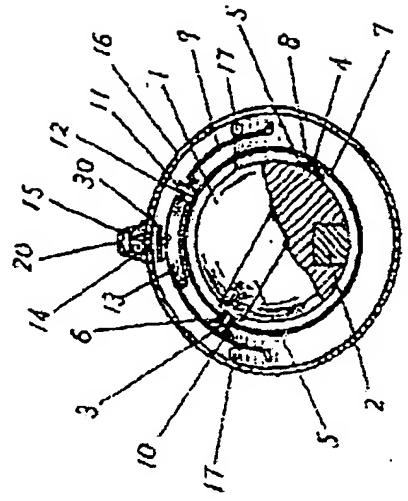
INT.CL. : G09B 27/04

TITLE : CONSTELLATION GUIDE DEVICE



ABSTRACT : PURPOSE: To enable characters and graphic which show a constellation to be seen in a visual field by rotating a spherical surface, which is supported by a container rotatably in any direction and recorded the constellation, characters and graphic around a diameter as axis parallel to the earth's axis.

CONSTITUTION: Two hollow hemispheres which are recorded the characters and graphic, showing the names and figures of the constellation, on their spherical surfaces 7 are joined mutually to form a rotatable hollow sphere. Consequently, the sphere is floated on transparent liquid for flotation and the fitting positions of an internal wall of a float 1, a ring body 5, a coupling piece 10, and the hollow hemispheres 9 are adjusted so that the rotary axis of the spherical surface 7 becomes parallel to the other axis and the cut surface of the hollow hemisphere 9 become horizontal and stationary; and necessary parts are fixed and the rotary axis of the spherical surface 7 is held penetrating the North pole and South pole of the sky. Consequently, the spherical surface 7 is rotated by a rotary driving device 13 at a speed of one turn per sidereal day and then a light image of the constellation can be seen in the visual field through the guide device.

⑲日本国特許庁(JP) ⑪特許出願公開

⑫公開特許公報(A) 平2-214886

⑤Int.Cl.' 識別記号 庁内整理番号 ⑬公開 平成2年(1990)8月27日
G 09 B 27/04 6763-2C

審査請求 未請求 請求項の数 2 (全4頁)

④発明の名称 星座案内器

⑳特 願 平1-36646
㉒出 願 平1(1989)2月16日

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明 細 書

1. 発明の名称 星座案内器

2. 特許請求の範囲

1 容器(6)によつてどの方向にも回動自在に支持され、星座ないし星座の名称を表示する文字もしくは図形あるいは文字および図形が記録された球面(7)に、この球面(7)を地軸に平行な球面(7)の直径を軸として回転させる装置(3)を併設した星座案内器。

2 特許請求の範囲第1項に記載した星座案内器に、星座ないし星座の名称を表示する文字もしくは図形あるいは文字および図形が記録された球面(7)を照明する装置(8)と、この装置(8)によつて照明された球面(7)の光像をこの装置が表示している星座の存在する方向に投影する光学系装置(9)を付設した星座案内器。

3. 発明の詳細な説明

この発明は星座を簡単に知るための案内器に関する。

夜空の星を特定するには、従来一般に天球儀や、星図で、その星のある星座の名称と形を知り、星座早見盤などで、その時期における星座の天球面上の位置を知つたうえで、見えている星を記憶している星座の形にあてはめる方法によつたが、天球儀には星座の形が真正しに描かれ、星図や星座早見盤には、天球面上に見える星座を平面上にあらわす必要から、形をゆがめ、部分に区切つて描かれているので星空の感じが伴わず、観測地では暗くて星図を見ることに困難であり、空の一部分が雲に覆われているときは星座を見誤り易い。

そこでこの発明は、任意の時に、任意の所で、任意の方向を観測すれば、その方向にある星座に伴つて、星座の名称や星座をあらわす文字、図形などが視野のなかに見える機能を持つた星座案内器を得ることを目的としている。

この発明の実施例を図面にもとづいて説明すればつぎの通りである。

第1図において、球形の浮子1の両極部に磁石2を装設し、外径の両端に軸3および軸4を突設した軸体5を浮子1の外径中央部に取り付ける。

天球上の星図および星座の名称、星座の形をあらわす文字および記号をその球面7に記録した2個の中空半球の中央に軸受管6および8を取り付け、軸3に軸受管6を、軸4に軸受管8を結合するとともに、2個の中空半球を相互に接合し回動自由な中空球にする。軸受管6から突出した軸3の頂部に中空半球9の内壁を結合片10を介して取り付け、この中空半球9の球面中央部に切り欠きをつくり、この切り欠き部に回転駆動装置13を取りつけ、この回転駆動装置13に係着された軸12を経つ摩擦車11を前記球面7に接触させる。以上の構成体を透明な浮上用液体に浸して浮上させ、球面7の回転軸の方向が地軸の方向と平行になり、中空半球9の底面が水平になつて静止するように、浮子1と軸体5および結合片10と中空半球9の内壁間の取り付け位置を調整し、所要部分を固着する。つぎに一方の球面の中央に小孔14を持つ等径な2個の透明中空半球を結合して得る球形容器16の内部に、前記構成体を多数の浮き粒子とともに収容し、これを小孔14から注入した浮上用液体によつて浮上させ、球面7の中心の高さが球形容器16の中心の高さに等しく、多数の浮き粒子17が底部にあつて容器16の球面内壁および中空半球9の球面外壁と転がり接触をなす状態にしたのち小孔14に浮動回転用のピン15をつイルばねを介して取り付け、ピン15の先端が容器16の内部へ自在に出入できるようにして、可撓性冠体20をピン15に冠着しその端部を容器16に密着する。

以上が特許請求の範囲第1項に記載した星座案内器についての説明であつて、つぎに特許請求の範囲第2項に記載した星座案内器について説明すると、第2図において、取り付けのための凹部および開口部を持つ外箱21の内部および底部に、特許請求の範囲第1項に記載した星座案内器を、ピン15の冠体20が外箱21の外壁から突出するように取り付け、電球22電源23点滅器24および電気部品により構成された照明装置18を、電球22が容器16の外壁の近くにあり点滅器24の押しボタン27が外箱21の外壁から突出するように取り付け、平面鏡25および26対物レンズ28接眼レンズ29とこれらを所定位置に内設した筒により構成された光学装置19を、この筒の一方の開口端が容器16の外壁に接するように取り付ける。

上記のように構成された星座案内器において、容器16の内部にある構成体は、浮き粒子17と転がり接触をしているので外力を受けることが少なくその地球に対する姿勢は浮力の中心と重心の位置および磁石の磁場と地磁気の方向によつて定まり軸体5に付けた軸すなわち球面7の回転軸は天の北極と南極を貫く方向に保たれるので、回転駆動装置13によつて球面7を1恒星日に1回の速度で回転させると、容器16をどの方向に動かしても、球面7の各部分は絶えず天球に対して向けた方向を保ち外力による姿勢の変化を復元しようとする復元力を持つている。

そこで第3図のように、天球上の恒星Aと球面7の中心Oを結ぶ線分の延長が球面7と交わる点A'に恒星Aを表示する記録をしておけば、恒星Aの位置を知りたいとき、点A'が球面の中心方向に見えるように目を移動すると、目から点A'に向う方向の天球上に恒星Aがあるので容易にこれを見つけることができる。全星座についてこれと同様の記録をしておけば、名称のわかる星座についてはその位置を知り、名称のわからない星座があるときは、この星座を覆うように案内器を差し出して球面7の中央に記された星座名を読むことによつて簡単に星座の名称を知ることができる。

このように特許請求の範囲第1項記載の星座案内器は従来のものより便利であるが、暗い所では球面7上の記録が見難いので補助的器具を必要とし、また第3図に示すように恒星Bに対する記録B'は実際の位置のずれに対して逆方向にずれ、星座の形は上下左右が反対になるので不便である。

特許請求の範囲第2項に記載した星座案内器は前記球面7を照明装置で照明し、その反射光を公知の光学系に導き、天球の星座に対して正立で見かけの倍率が1になるような像をつくり、これを天球の星座に合わせて観察するもので、第2図において、対物レンズ28で倒立実像をつくり、これを接眼レンズ29で拡大虚像とし、レンズの位置を

調節して光量による星座と天球の星座の見かけの大きさを等しくする。つぎに回転駆動装置13を操作して恒星のひとつとこれに対する光像を合致させると、全星座に亘ってこのように合致することになるので、天球の全星座に対しても見かけの大きさも等しい光像を案内等を通した視野内に投映することができ、容易に星座の名称を知り、また容易に恒星を探索することができる。

回転駆動装置13は常に球面7の中心の鉛直上方にあるので、さらにその鉛直上方に座体20を位置させ手動で上下動をさせピン15受け板30を介してこの運動を公知の機構により回転運動に変え原板軸11に伝えて球面7を回転させる手動回転装置と1恒星日に1回の回転を球面7に与えるように原板軸11を回転させる自動回転装置を併用すれば、回転の進み遅れの調整のほかに、回転早送りによる地平線の恒星の出現の様子なども見ることができる。中空半球9は地平線下に相当する球面7の部分を覆って案内等の視野内を地平線付近の夜空の感じに近づけることに役立たせたものである。

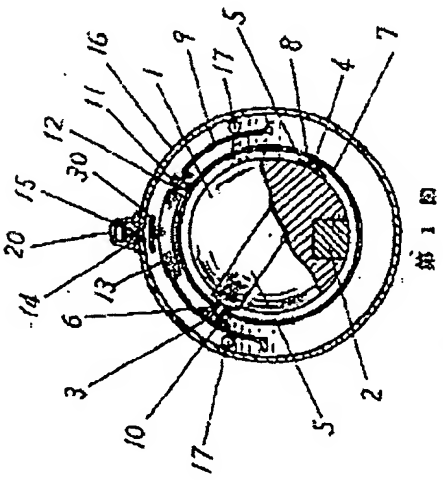
(7)

4. 図面の簡単な説明

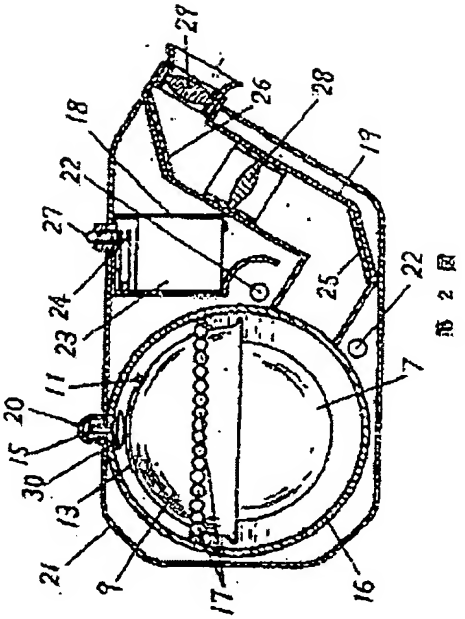
第1図は特許請求の範囲第1項記載の星座案内等の一部破断回転軸方向の断面図、第2図は特許請求の範囲第2項記載の星座案内等の光学系装置18の光軸を含む方向の一部断面図、第3図は恒星とこの恒星を表示する記録の位置関係を示す図である。

特許出願人　　本田栄次

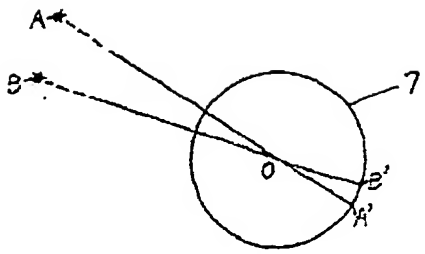
(8)



第1図



第2図



第 3 図

April 27, 2004

To Whom It May Concern,

I hereby certify that I am proficient in both Japanese and English, and that the foregoing is a true and accurate translation of the Japanese documents to the best of my ability.

Julie A. Foster

Julie A. Foster 4-27-04

Translation from Japanese

(19) Japanese Patent Office (JP)

(12) Official Gazette for Unexamined Patent Applications (A)

(11) Japanese Unexamined Application [Kokai] Patent No.: **Hei 2(1990)-214886**

(43) Kokai Publication Date: August 27, 1990

(51) Int. Cl.[5] Identification Nos. Intra-Bureau Nos.

G 09 B 27/04 6763-2C

Request for Examination: Not filed Number of Claims: 2 (4 pages total)

(54) Title of the Invention: Constellation Guide Device

(21) Application No.: Hei 1(1989)-36646

(22) Filing Date: February 16, 1989

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(72) Inventor: Eiji Honda, 97-8, Maeshinden-kabuto [transliteration], Toyosaka-shi, Nigata-ken

Specifications

1. Title of the Invention Constellation Guide Device

2. Claim(s)

1. A constellation guide device in which a device (13), which rotates a spherical surface (7) about the diameter of the spherical surface (7) that is parallel to the earth's axis, to the spherical surface (7) which is supported by a container (16) to freely rotate in any direction and on which characters or graphics, or characters and graphics representing a constellation or the name of a constellation are recorded.

2. A constellation guide device to which is attached a device (18), which illuminates the spherical surface (7) in the constellation guide device of claim 1 recorded with the characters or graphics, or characters and graphics representing a constellation or the name of a constellation, and an optical device (19) for scanning a light image on the spherical surface (7) illuminated by this device (18) in the direction in which the constellation represented by this light image is present.

3. Detailed Specifications

This invention relates to a guide device for easily realizing a constellation.

In order to specify a star in the night sky, generally realizing the name and shape of the constellation belonging to that star in the past from a celestial globe or star map, and realizing its position on the surface of a celestial sphere of constellations at that moment from a star chart of constellations, etc., were accomplished in a method in which the star under observation was adapted to the stored shape of the

onstellation. Since the shapes of constellations on a celestial globe are drawn inverted, it is necessary that a constellation observable on the surface of a celestial sphere be displayed on a flat surface, which, however, is depicted with a distorted shape and divided into sections; hence, there is no sense of a starry sky, it is difficult to observe a star map in the dark at an observation site, and the constellation is easily misread when part of the sky is obscured by clouds.

An object of this invention, therefore, is to obtain a constellation guide device having a structure whereby, when scanning any given direction from any given place at any given time, the name of a constellation, and characters or graphics, and the like representing the constellation are observed in a visual field corresponding to a constellation present in the direction thereof.

The working examples of this invention will be described on the basis of the drawings as follows.

In Figure 1, a magnet 2 is embedded in a peripheral wall portion of a spherical float 1, and a ring body 5 having a shaft 3 and a shaft 4 extending from both ends on the outer diameter, is installed in the center of the outer wall of the float 1.

Bearing shells 6 and 8 are installed in the centers of two hollow hemispheres where a constellation on the celestial sphere, the name of the constellation, and characters and graphics representing the shape of the constellation have been recorded on the spherical surface 7 thereof. The bearing shell 6 is supported rotatably by a shaft 3 and the bearing shell 8 by a shaft 4, and at the same time, the two hollow hemispheres are joined together to obtain a freely rotating hollow sphere. The inner wall of a hollow hemisphere 9 is installed on the head portion of the shaft 3 protruding from the bearing shell 6 by way of a coupling piece 10, a notch is formed in the center of the spherical surface of this hollow hemisphere 9, a rotary driving device 13 is installed in this notched portion, and a frictional wheel 11 having a shaft 12 matingly attached to this rotary driving device 13 contacts the aforesaid spherical surface 7. The construction above gets immersed in a transparent floating liquid and rises to the surface, so the direction of the rotating shaft of the spherical surface 7 becomes parallel to the direction of the earth's axis. So that the cut face of the hollow hemisphere 9 comes to a standstill horizontally, the position where the construction is installed between the inner walls of the float 1 and wheel body 5 as well as the coupling piece 10 and the hollow hemisphere 9 is adjusted and these required parts are fixed. The aforesaid construction is accommodated, along with a number of a floating rotating elements, inside a spherical container 16 obtained by joining two transparent hollow hemispheres of the same diameter and having a small hole 14 in the center of a spherical surface on one side, which construction rises to the surface on the floating liquid poured through the small hole 14, the height of the center of the spherical surface 7 is equal to the height of the center of the spherical container 16, the numerous floating rotating elements 17 are brought into a state in which they rotatingly contact the inner spherical wall of the spherical container 16 and the outer spherical wall of the hollow hemisphere 9 at the liquid surface, after which a pin 15 for manual rotation use is installed in the small hole 14 by way of a coil spring. So that the front end of the pin 15 is capable of freely coming in and out of the inside of the spherical container 16, the pin 15 is crowned with a flexible crown body 20, and that end is attached to the container 16.

While the constellation guide device of claim 1 was described as above, the constellation guide device of claim 2 is described next. In Figure 2, so that the crown body 20 of the pin 15 protrudes from the outer wall of an outer box 21, the constellation guide device of claim 1 is installed inside and on the side

of an outer box 21 having a recessed part and opening for installation, an illumination device 18 composed of a light bulb 22, an outlet 23, an electric switch 24, and an electric wire is installed so that the light bulb 22 is present near the outer wall of the spherical container 16 and the push button 27 of the electric switch 24 protrudes from the outer wall of the outer box 21, and an optical device 19 composed of flat mirrors 25 and 26, objective lens 28, ocular lens 29. A pipe in which these components are provided internally at required positions is installed so that the end of the opening on one side of this pipe comes in contact with the outer wall of the spherical container 16.

In the constellation guide device constituted as described above, the construction present inside the spherical container 16 rotatingly contacts the floating rotating elements 17; hence, little outside force is received, the attitude to the earth is determined by the center of the buoyancy, the position of the center of gravity, the field of the magnet, and the direction of the geomagnetism. And the shaft attached to the ring body 5, namely, the rotating shaft of the spherical surface 7 is maintained in the direction in which the North and South poles penetrate the sky; hence, if the spherical surface 7 is rotated by the rotary driving device 13 at a speed of one cycle per sidereal day, no matter what direction the spherical container 16 moves in, each part of the spherical surface 7 is maintained in a direction facing the celestial sphere, and the righting moment for restoring a change in attitude by outside forces is maintained.

Therefore, as shown in Figure 3, when the position of a fixed star A is realized by obtaining a recording displaying a fixed star A at a point A′, where extension of the line segment connecting the fixed star A on the celestial sphere to the center O of the spherical surface 7 intersects the spherical surface 7, by directing the eyes towards the center of the spherical surface so that the point A′ is seen, a fixed star A is present on the celestial sphere in the direction from the eye to the point A′, and this fixed star can be easily located. If all the constellations are recorded in the same way as this, when the positions of constellations with known names are already known but there is a constellation with an unknown name, the guide device is held out so as to cover this constellation, and the name of this constellation can be realized easily by reading the constellation name registered in the center of the spherical surface 7.

Although the constellation guide device of claim 1 is more convenient than a conventional one as such, auxiliary equipment is required since a recording on the spherical surface 7 is difficult to see in a dark place. Moreover, a recording B′ for a fixed star B, as shown in Figure 3, shifts in the reverse direction of the actual position of the constellation, which is inconvenient since its right, left, top and bottom sides are reversed to those of the constellation.

The aforesaid spherical surface 7 of the constellation guide device of claim 2 is illuminated with an illumination device, the reflected light therefrom is guided to a well-known optical system where an image is produced upright with respect to a constellation of celestial spheres so that the apparent magnification is 1, and this is matched to the constellation of celestial spheres being scanned. In Figure 2, an inverted real image is produced by the objective lens 28, an enlarged virtual image of it is obtained through the ocular lens 29, and the position of the lens is adjusted to make the apparent size of the constellation by the light image equal to that of the constellation of celestial spheres. When the rotary driving device 13 is operated and the light image of a fixed star is conformed to it one by one, the fixed stars in the entire constellation are conformed in this way; hence, a light image with a shape and apparent size equal to the overall constellation of celestial spheres can be scanned in a visual field via the guide device, so the name of the constellation is realized with ease and the fixed stars may be searched for easily.

Since the rotary driving device 13 is always present vertically above the center of the spherical surface 7, and further, if a manual rotating device, which rotates the spherical surface 7 by perpendicularly positioning the crown body 20 thereabove, effecting a vertical movement with a finger, accepting the pin 15, converting this motion to gyration by means of a well-known mechanism through a plate 30, and transferring of this motion to the frictional wheel 11, is combined with an automatic rotating device, which rotates the frictional wheel 11 so that one cycle of rotation per sidereal day is applied to the spherical surface 7, other than adjusting a delay in the progression of rotation, the aspects and the like of the fixed stars emerging on the horizon by a rapid rotation also can be observed. The hollow hemisphere 9 covers the part of the spherical surface 7 corresponding to the region below the horizon, which is helpful for bringing the visual field of the guide device closer to the feeling of the night sky in the vicinity of the horizon.

4. Brief Description of the Drawings

Figure 1 is a partially broken cross section of the constellation guide device of claim 1 in the rotating axial direction; Figure 2 a partial cross section of the constellation guide device of claim 2 in the direction including the optical axis of the optical device 19; and Figure 3 is a drawing showing the positional relationship between a fixed star and a recording representing this fixed star.

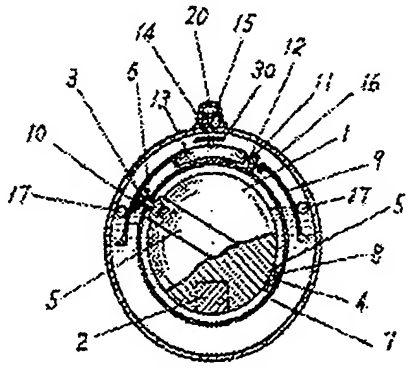

Figure 1

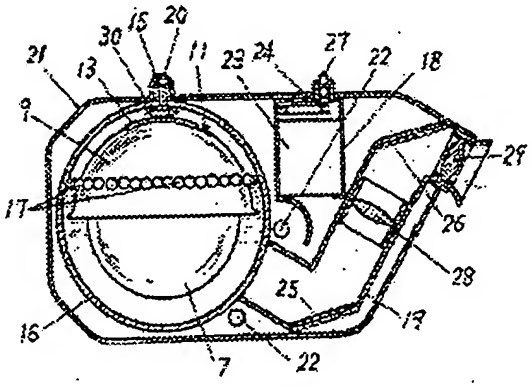

Figure 2

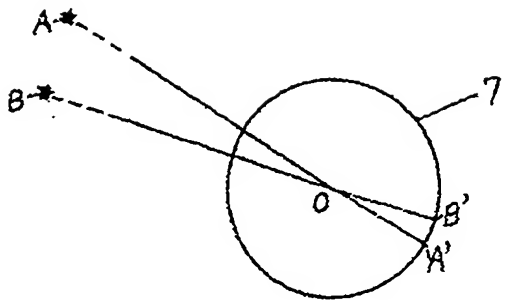

Figure 3

Translated by Julie Foster

Julie A Foster 4-27-04